YATES'

PATENT

SAFETY LAMP

HAS THE FOLLOWING ADVANTAGES :—

PERFECT SECURITY;

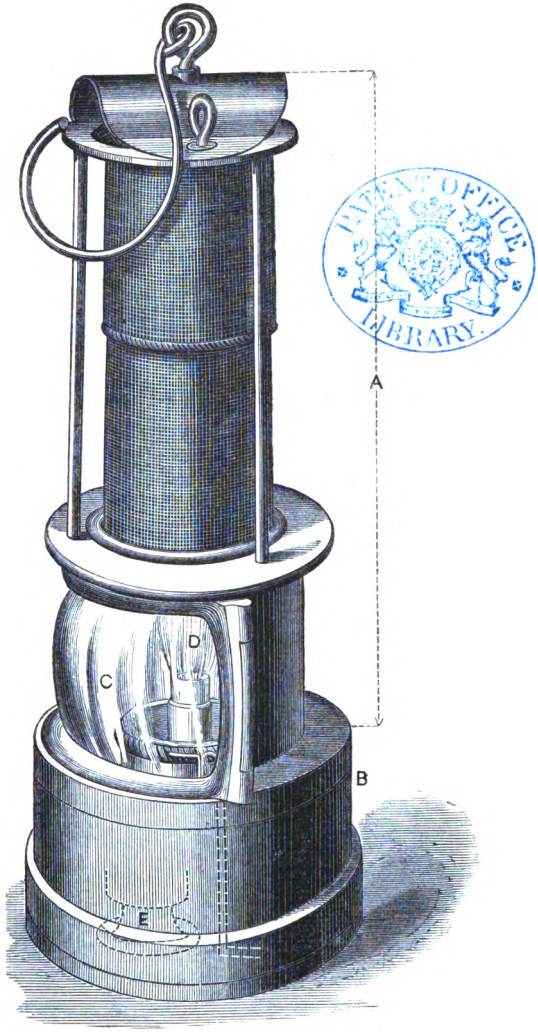
SAVING OF HALF THE OIL;

GREATLY INCREASED LIGHT;

In comparison with any other Miners' Safety Lamp.

OFFICES :—

24, DUKE STREET, WESTMINSTER.



Description of Illustration.

A. Upper portion of lamp, comprising wire gauze column, lens (**C**), reflector (**D**).

B. Lower portion, comprising the oil reservoir and extinguishing apparatus, and the screw for unlocking the lamp (**E**).

C. The lens. **D.** The reflector. **E.** Unlocking screw.

PREFACE.

SHOULD the retentive memory of some technical reader recall to his recollection, whilst perusing this paper, that he had previously met with something very similar, and that the subject discussed was not quite new to him, let me premise and explain that I wrote the chief portion of the following sketch to describe an earlier invention, intended to effect the same objects as the present improved apparatus, viz. :—perfect security, much increased light, with an important saving in oil consumed in miners' lamps, but which differed considerably in its details from my present arrangement. When the former mechanical device for extinguishing the light was shown to practical mining engineers, they condemned it as "too complicated," called it "watch work, too liable to get out of order, and altogether too delicate for the rough usage of hard-handed colliers and other operatives." That plan was also unprovided with a lock, now rendered necessary by an enactment in the Mines Regulation Act of 1872 (35 & 36 Vict., c. 76). Consequently I had to alter that pattern and plan, so I contrived the present apparatus, as described in my more recent specification, and illustrated by the wood-cut given with this issue of my pamphlet, and which far stouter and more durable instrument I now submit for adoption, as these devices fulfil all necessary requirements, are much less complicated, far stronger, and almost free from the possibility of getting out of order. Furthermore, as a result of their greater simplicity, I am enabled slightly to reduce the price at which lamps, made according to my present more approved pattern, can be sold. I trust, therefore, that it will be acknowledged that I have in a two-fold manner enhanced my lamps, viz., in efficiency and in economy.

for
The Patent Office
Library -
from the Writer -
22nd March 1873

YATES' PATENT SAFETY LAMP.

I BEG very respectfully, but very earnestly, to call the attention of mine owners, mining engineers, viewers, and all persons interested in mining operations, as well as others engaged in occupations hazardous from the danger of explosions or fire, to the advantages of my improved lamp, which combines perfect security, much increased light, and great economy in oil; it may also be called self-extinguishing.

The object of my invention is to construct miners' lamps in such a manner that they cannot be tampered with or opened by the miner without first extinguishing the light, thus preventing all risk of explosions in the mine from an exposure of the naked flame.

To this end I adapt to the body of the lamp a locking bolt, which will prevent the lower part from being unscrewed or detached from the upper part until such bolt is drawn back. This locking bolt is constantly kept pressed forward by means of a particular spring, and is provided with an arm which bears against a shoulder or block on a screwed pin which works the wick carrier up and down; this screwed pin is provided outside the lamp with a milled head, whereby it can be turned.

When the lamp has been trimmed and lighted, the oil reservoir must be screwed into its place in the upper part, the locking bolt will then bear against some ratchet teeth, the upper end of this bolt will run over these special teeth

as the lamp is screwed in, but the bolt will effectually prevent the lamp from being unscrewed and taken apart until the bolt has been withdrawn in the manner previously described, *but the light will have been meanwhile extinguished before* the upper and lower portions of the lamp can be separated, and therefore all danger from any exposure of a naked flame is absolutely impossible.

The improved light is obtained by a strong and powerful lens glass, securely fixed in a metal frame in front, and a silver-plated reflector at the back of the light, thus producing many times the amount of light for the same quantity of oil consumed in the old Davy Lamps: and the perfect security by an apparatus which puts out the light coincidentally with any attempt of the miner to open his lamp; indeed, the extinguishing device is positively made to operate by that self-same perfidious act.

This pamphlet is likewise addressed to philanthropists, to whom it is hoped that it will be interesting, as it is confidently expected that by the adoption of YATES' Lamp most, if not all, the fatal accidents arising from the use of naked lights in mines subject to fire-damp will be rendered impossible. To those unacquainted with the statistics of mining it will be appalling to learn that the number of fatal accidents from explosions in mines amounts to over* 300 a year, or nearly a man a day, killed from a cause now happily avoidable by enforcing the use of YATES' Lamp, with its so-to-say automatic extinguishing apparatus.

On the introduction of the Mines Regulation Bill into the House of Commons on the 23rd February, 1871, Mr. MUNDELLA reminded the house that of the 330,000 miners in Great Britain 1,100 were killed, on the average, in a year, and 10,000 injured; and of this last number 5,000 were permanently crippled.

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* See P.S. on page 13.

The safety-lamp now in general use, in consequence of the light having to struggle through the close wire-gauze, does little beyond making darkness visible, which is very gloomy and depressing; and, as it undeniably does not give sufficient light to the miner to enable him to do his work properly, he is often tempted (of course at the hazard of an explosion, frequently fatal to life, and always destructive to property) to open his lamp, and thus to expose the naked flame.

YATES' Improved Safety Lamp gives a cheerful light—estimated at twenty times that of the old "Davy," and sufficient for all necessary purposes, and therefore this temptation to expose the light is removed. Colliers are, however, so accustomed to danger that they grow reckless and despise it; and frequently, for the transient indulgence of a smoke of a pipe of tobacco, will run the risk not only of their own lives, but also of those of their fellow workmen, and of damage to their employers' property. All this is now capable of being guarded against and prevented, as the act of withdrawing the unlocking bolt concurrently actuates the extinguishing device in my lamp, and effectually hinders them from getting at the wick so as to expose the naked flame; it also serves as a tell-tale to indicate that the miner has been disobeying regulations by attempting to open his lamp.

Now that reliable mechanically-extinguished lamps can be obtained, it is to be hoped that very stringent rules will be enacted by the Legislature to make it imperative on all mine-owners to adopt them, and that a very severe punishment will be inflicted on all colliers risking their own and other lives, and the mine-owners' property, by exposing naked lights.

Happily, these advantages are offered with the additional inducement of a considerable economy, as my lamps (paradoxical as it may appear) afford many times the light of the old "Davy" with a decreased consumption of oil, equal to a saving of 50 per cent., or one-half—say 1½ gallons of oil per annum, or in money value about 6*s*. a year, on every

YATES' Lamp in use; so that the saving in oil in one year would about pay for the outlay incurred in the alteration of each present inefficient "Davy" lamp into my more perfect and improved lamp;* thus giving, *cost free*, to the mining community all the other advantages of YATES' Lamp above described — benefits which, it is trusted, they will rightly esteem, and testify their appreciation of, by universally adopting my lamp.

Cost of a YATES' Lamp per week—

Wear and tear, say	1*d.*
Oil consumed per annum—3 gallons at 4*s.* = 12*s.*, or 1*s.* per month	3*d.*
Cost of light per week...	4*d.*

Or two-thirds of a penny (a half-penny and a fraction a day).

The cost of candles per diem is about 1*d.* : or 6*d.* per week.

The foregoing calculation is especially commended to the notice of members of the Legislature, Government Inspectors, Coroners, also to mine owners, managers' "Butties," "Doggies," and underground bailiffs of colleries in districts where candles (necessarily naked lights) are still permitted to be used in the pits, as it shows that even the poor apology of a petty saving in the working expenses—too frequently a false economy—no longer remains as an excuse, much less a justification, for endangering the valuable lives of the colliers, often the bread-winners for large families; and it is thought that this view of the matter should interest the clergymen and overseers of parishes in which mines are still worked with exposed lights.

I propose to adapt my improvements to any existing safety lamp. See Price List, at page 15 (on fly leaf).

Should any mine-owner prefer to hire lamps instead of purchasing them, it is suggested that an arrangement to this effect could be entered into, in which case old lamps would be taken at a fair valuation, repaired, and altered, and these or

* By using mineral oils, which in my lamps can be done with perfect safety, a further considerable saving could be effected.

others returned in their places; and an agreement *for a term of years* could be made for the hire at a fixed amount per annum—say ¾*d.* per week for each altered old lamp, and 1*d.* per week for each new and complete YATES' Lamp. Security (if required) to be given for lamps let out on hire, or the rental to be paid, say, every three months, in advance.

It would seem to be appropriate at this place to point out the pecuniary value of my lamps to both masters and men.

Firstly, with respect to the working miner, it has been calculated by a good practical manager of some extensive collieries *that the increased light will, in addition to the comfort it affords, enable a collier to do more work in a given time.* This he estimates at 3*d.* per day, or 1*s.* 6*d.* per week. For this benefit it is considered fair that the workman should be charged by his employer ½*d.* per week, or 2*s.* 2*d.* a year, for the loan of the Improved Lamp. It is an axiom, that what we get for nothing we never rightly esteem, therefore it is expected that this payment (small as it is) and liability for damages done to the New Lamp will make the miner careful of his trust; and, as it will not be possible to supply all the miners at once, in order further to encourage the desire for the better lamp, it is suggested to the masters and managers to give the YATES' Lamps, in the first instance, to the overlookers and picked men, and afterwards to the working men in succession—making the privilege of having one a reward of merit, and in this way stimulating the men to become ambitious of having the New Lamp entrusted to them.

Put into money value, the gain by using my Lamp, on the above showing, would be worth 1*s.* 6*d.* a week, or £3 18*s.* a-year, for a payment of 2*s.* 2*d.*, or under 3 per cent. of the extra sum a collier would be enabled, by its increased light, to earn.

Secondly, as respects masters, they would have enhanced safety to their property, and more coal could be won in a

given time; and they would benefit directly in a pecuniary way as follows, during the run of my patent:—

Saving in oil, at 6*s.* per year ...	... for 14 years	£4	4 0
Lamp hire from colliers, 2*s.* 2*d.*	... ,, ,,	1	10 4
For every Lamp in use	... ,, ,,	5	14 4

In the foregoing particulars, wherever prices, figures, or calculations are inserted, they are only intended to be illustrative, and are not perhaps quite exact, though practically they approach as nearly thereto as our present limited experience will allow.

It will be encouraging to those who have not seen a YATES' Lamp to hear that wherever shown, as now arranged—whether to owners, managers, or to working colliers,—it has been unexceptionally approved; the only doubt entertained was whether the lenses were liable to spring or crack on any violent change of temperature, as, for instance, in case of a sudden rush of water upon them—[they are protected from collisions by a projecting rim]. In order to set this question at rest, the manager of a very important colliery in South Wales (who is willing, if called upon, to certify to this effect) had a lamp made as hot as it could become in any manner of working, and then had cold water thrown over it and dashed against the lens, all which very rigorous tests the lamp fairly withstood without injury. It may here be mentioned that the lenses are made in a very peculiar manner, and most carefully annealed, so as to render them practically undamageable and capable of bearing all possible hardships.

YATES' Safety Lamps are also very well adapted for use in powder mills and magazines, cartridge and firework manufactories, gas works, retort houses, naphtha and creosote works and warehouses, ship's holds, dock and wine merchants' and other cellars, oil and corn mills, forage depots, and elsewhere wherever combustible articles are manufactured and stored, whether by dock, railway companies, wharfingers or others.

As it is considered to be in the general interest of all concerned, whether as patentees, licensees, or customers, so far as possible to prevent infringements and imposition by the fraudulent introduction into the market of an inferior and untrustworthy lamp, it is intended that each YATES' Lamp shall bear my name, a distinctive number or mark, and perhaps also a date, so as to facilitate the detection of any unlicensed manufacture or use of them. And, before permission to make or to use YATES' Lamps, all parties applying to do so may be required to enter into an agreement or contract to afford me every aid and assistance in their power so as to enable me to have examined all lamps in use, to see that they are all properly numbered and marked, and in accord with the license.

An agreement, embodying the above conditions, will be submitted for signature to all parties ordering YATES' Lamps.

In conclusion, permit me particularly to request that all enquiries on the business of my Safety Lamp should be addressed to me at my office in London, as given below, where sample lamps can be seen and all information obtained; and that all applications about altering old lamps or ordering new lamps, or for hiring them, should, for regularity's sake, in the first instance, be sent *in writing* to that office; and that lamps should not in any case be indiscriminately ordered from lamp-makers direct, as only those duly licensed will be permitted to undertake and to execute orders.

WILLM. YATES.

24, DUKE STREET, WESTMINSTER,
LONDON, S.W.

P.S.—To illustrate in an approximate manner the gross money value of this practical and reliable invention in the United Kingdom, I will refer to a report which appeared about Christmas last (1872) of a meeting held at Salford, to receive and audit the accounts of an Association for the Reformation of Criminals, and for affording them assistance, pecuniary and

otherwise, to enable them to return to an honest course of life. It was shown that the expenditure had been for the year two hundred pounds.

The Earl of Derby, who presided, remarked that he should consider the money well laid out if only one culprit had been reclaimed and brought back to honest industry.

I purpose to adopt his Lordship's estimate of the money value of a rescued outcast. If, then, a reformed criminal is worth £200, certainly a well-conducted collier is at the least of equal, if not of much superior value.

By statistical reports on mining and mines in the United Kingdom it is shown that the loss annually occurring through explosions of fire and choke damp, and their consequences, reaches the appalling number of three hundred lives.

It is certain that the catastrophes from fire damp at collieries, miscalled accidents, are always caused by the pitmen opening their Davy lamps (which, constructed as they now are, is very easy), and then working with naked lights.

I believe that by a general adoption and strictly conscientious use of lamps made on my principle, which the colliers cannot by any possibility unfasten, so as to expose the naked light, this lamentable loss of life could be prevented; indeed, I am bold enough to assert that these three hundred precious bread-winners would and must be spared to their families.

Taking, then, that number, and multiplying it by the value in money of a reclaimed operative, as above appraised by Lord Derby, we make the sum of human life saved in a year amount to the not unimportant aggregate of sixty thousand pounds, thus—

Lives.		£		£
300	×	200	=	60,000

Capitalising this annual saving of £60,000 at 4 per cent., we bring out the grand total of one and a half million of pounds sterling (£1,500,000) as the estimated value of this simple invention to the nation.

PRICE OF YATES' PATENT SAFETY LAMPS.

	No. 1.		No. 2.	
	s.	*d.*	*s.*	*d.*
If ordered by single Lamps, for trial, *each*,	10	0	10	6
,, the Dozen ... ... ,,	8	6	9	0
,, ,, Half-Gross ... ,,	8	0	8	6
,, ,, Gross ... ... ,,	7	6	8	0

Cost of converting other kinds of Lamps into Yates' Improved Safety Lamps could be undertaken by a special contract.

Delivery free to the station at Birmingham.

Packing cases and other expenses extra.

Extra lenses will be supplied only by my appointed agents, at from 9*s.* to 12*s.* per doz.

This reservation is kept under my own control, in order that not any lenses, *which have not been properly annealed and duly tested*, shall get into use.

SUBJECT TO FLUCTUATIONS.

HARRISON AND SONS, Printers in Ordinary to Her Majesty, St. Martin's Lane